Evolution of the 'Trick' Dynamic Software Executive and Model Libraries for Reusable Flight Software, Phase I

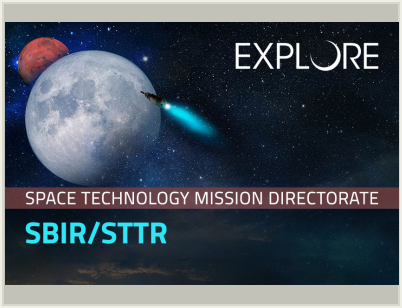
Completed Technology Project (2009 - 2009)

Project Introduction

In response to a need for cost-effective small satellite missions, Odyssey Space Research is proposing the development of a common flight software executive and a fundamental set of reconfigurable flight software modules. This application will directly affect the development cost by avoiding the need to develop software from scratch and allowing the efficient reuse of flight software even across vehicles. Odyssey proposes to use NASA's Trick simulation environment to form the basis of the flight software executive and to use NASA's Common Model Library to form the basis for the reconfigurable modules. Trick is currently capable of producing a software architecture that is easily modified to allow the use of software modules in the production of a simulation framework. We are proposing modifying and adapting Trick for the production of software that easily moves out of the simulation realm and into the embedded flight software realm. Our proposed approach to providing reusable flight software is innovative in that it takes a well established open platform simulation tool and advances it to a level where it can be combined with reconfigurable software modules. This in turn can be used to produce highly reconfigurable flight software allowing for the same software development environment to be used across the entire life cycle of the system.

Anticipated Benefits

Reconfigurable and re-usable flight software has potential application to any developer of spacecraft with missions that are contained in the defined software module envelope. Additional modules will likely expand the potential scope and applicability. The range of "potential post applications" can include government agency sponsored science missions, formation flying or constellation missions (i.e., missions with multiple identical, or nearly identical spacecraft), and ultimately service missions (e.g., weather, communications, etc.). The motivation to reduce cost will attract significant interest and buy-in once it is demonstrated on a real, flying spacecraft -- most probably on a NASA-based mission such as the "small spacecraft build" project. Since this approach involves a paradigm shift among spacecraft developers, applying the same architecture and software on two similarly classed (but not identical) missions would provide the best proof. The Department of Defense is a large potential market that would likely adopt and even expand on this concept once it has been implemented.



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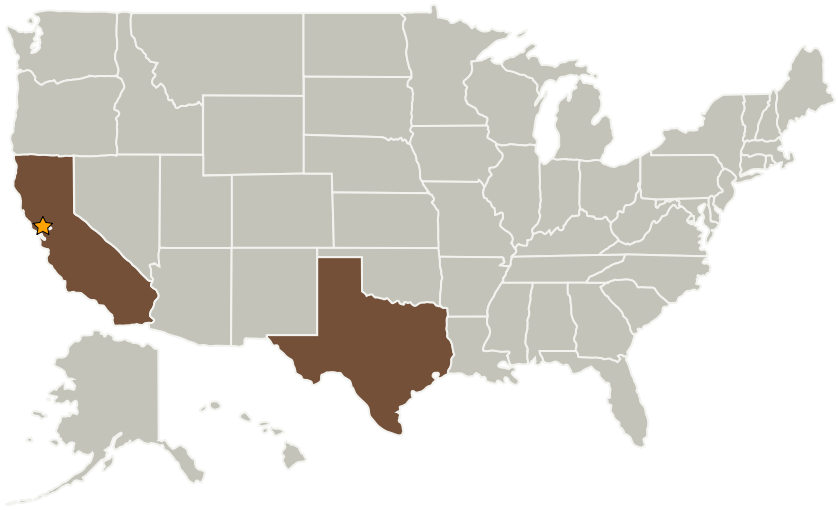
Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★Ames Research Center(ARC)	Lead Organization	NASA Center	Moffett Field, California
Odyssey Space Research, LLC	Supporting Organization	Industry Women-Owned Small Business (WOSB)	Houston, Texas

Primary U.S. Work Locations	
California	Texas

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Ames Research Center (ARC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Project Manager:

Elwood F Agasid

Principal Investigator:

David Hammen

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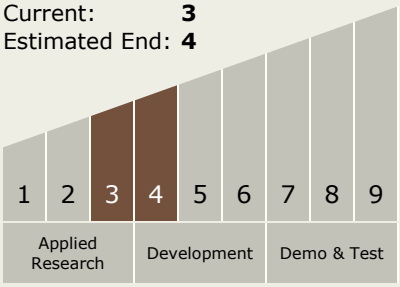
Completed Technology Project (2009 - 2009)

Technology Maturity (TRL)

Start: **3**
Current: **3**
Estimated End: **4**



Technology Areas

Primary:

- TX07 Exploration Destination Systems
  - TX07.3 Mission Operations and Safety
    - TX07.3.1 Mission Planning and Design